

WE CLAIM:

1. A suturing instrument comprising:
2 an elongate body member having a longitudinal axis;
a suture deployment system located within a distal end
4 portion of said elongate body member wherein said distal
end portion includes a suture exit port, said suture
6 deployment system comprising:
a curved suture carrier channel; and
8 a curved suture carrier movably positioned in
said curved suture carrier channel;
10 and
a deployment controller having a proximal end, a
12 distal end, a retracted position and a deployed position,
said deployment controller extending substantially along
14 the longitudinal axis of said elongate body member to the
distal end of said elongate body member where it is coupled
16 to said curved suture carrier and moves said curved suture
carrier through said curved suture carrier channel as it
18 moves between said retracted position and said deployed
position, said curved suture carrier channel configured
20 within said distal end portion of said elongate body member
such that said curved suture carrier exits said suture exit
22 port and is guided along a path which includes a proximal
curved path segment such that a surface of said curved
24 suture carrier is substantially adjacent with an outer
surface of said distal end portion of said elongate body
26 member along said proximal curved path segment.

2. A suturing instrument as defined in Claim 1 further
2 comprising a suture catch positioned proximate to said distal
end portion of said elongate body member such that a distal path
4 segment of said curved suture carrier path is intercepted by
~~said suture catch as said deployment controller approaches said~~
6 deployed position.

3. A suturing instrument as defined in Claim 1 further
2 comprising a surgical needle positioned in a distal end of said
curved suture carrier.

4. A suturing instrument as defined in Claim 3 wherein
2 said surgical needle further comprises a bullet needle.

5. A suturing instrument as defined in Claim 1 wherein:
2 said curved suture carrier channel and said curved
suture carrier are located in a distal tip assembly of said
4 elongate body member; and
said distal tip assembly is joined with said elongate
6 body member such that said distal tip assembly is free to
rotate axially about said elongate body member longitudinal
8 axis.

6. A suturing instrument as defined in Claim 1 wherein
2 said deployment controller is coupled to said curved suture
carrier with a flexible driver member.

7. A suturing instrument as defined in Claim 6 wherein
2 said flexible driver member further comprises an alloy of nickel
and titanium.

8. A suturing instrument comprising:
2 a body member;
a suture exit port formed in said body member;
4 a curved suture carrier channel formed in said body
member; and
6 a curved suture carrier movably positioned in said
curved suture carrier channel, wherein said curved suture
8 carrier has a retracted position such that said curved
~~suture carrier is positioned within an interior region of~~
10 said body member and a deployed position such that a
portion of said curved suture carrier is positioned
12 exterior to said body member, said curved suture carrier
configured within said curved suture carrier channel such

14 that said curved suture carrier exits said interior region
16 of said body member through said suture exit port and is
18 guided along a path which includes a proximal curved path
 segment wherein a surface of said curved suture carrier is
 substantially adjacent with an outer surface of said body
 member along said proximal curved path segment.

9. A suturing instrument as defined in Claim 8 further
2 comprising a suture catch positioned on said body member such
 that a distal path segment of said curved suture carrier path is
4 intercepted by said suture catch.

10. A suturing instrument as defined in Claim 8 further
2 comprising a surgical needle positioned in a distal end of said
 curved suture carrier.

11. A suturing instrument as defined in Claim 10 wherein
2 said surgical needle further comprises a bullet needle.

12. A suturing instrument comprising:
2 an elongate body member having a longitudinal axis;
 a distal tip suture deployment assembly joined with a
4 distal end of said elongate body member such that said
 distal tip assembly is free to rotate axially about said
6 elongate body member longitudinal axis, said distal tip
 suture deployment assembly comprising:
8 a distal tip body member;
 a suture exit port formed in said distal tip body
10 member;
 a curved suture carrier channel formed in said
12 distal tip body member; and
 a curved suture carrier movably positioned in
14 said curved suture carrier channel;
 and
16 a deployment controller having a proximal end, a
 distal end, a retracted position and a deployed position,
18 said deployment controller extending substantially along

the longitudinal axis of said elongate body member to the
20 distal end of said elongate body member where it is coupled
to said distal tip suture deployment assembly and moves
22 said curved suture carrier through said curved suture
carrier channel as it moves between said retracted position
24 and said deployed position.

13. A suturing instrument as defined in Claim 12 wherein
2 said distal tip suture deployment assembly is configured to have
a retracted position such that said curved suture carrier is
4 positioned within an interior region of said distal tip body
member and a deployed position where a portion of said curved
6 suture carrier is positioned exterior to said distal tip body
member, said curved suture carrier configured within said curved
8 suture carrier channel such that said curved suture carrier
exits said interior region of said distal tip body member
10 through said suture exit port and is guided along a path which
includes a proximal curved path segment wherein a surface of
12 said curved suture carrier is substantially adjacent with an
outer surface of said distal tip body member along said proximal
14 curved path segment.

14. A suturing instrument as defined in Claim 12 further
2 comprising a suture catch positioned on said distal tip body
member such that a distal path segment of said curved suture
4 carrier path is intercepted by said suture catch as said
deployment controller approaches said deployed position.

15. A suturing instrument as defined in Claim 13 further
2 comprising a suture catch positioned on said distal tip body
member such that a distal path segment of said curved suture
4 carrier path is intercepted by said suture catch as said
~~deployment controller approaches said deployed position.~~

16. A suturing instrument as defined in Claim 12 further
2 comprising a surgical needle positioned in said distal end of
said curved suture carrier.

17. A suturing instrument as defined in Claim 16 wherein
2 said surgical needle further comprises a bullet needle.

18. A method for placing a suture in thin tissue adjacent
2 bone structure comprising:

placing a suturing instrument which encloses a curved
4 suture carrier which is movably positioned within a curved
suture carrier channel adjacent the tissue to be sutured;
6 and

deploying the curved suture carrier out of the
8 suturing instrument through an exit port such that the
curved suture carrier exits an interior region of said
10 suturing instrument through said exit port along a path
which approaches being substantially tangential to an outer
12 surface of said suturing instrument surrounding said exit
port.

19. A suturing instrument comprising:

2 a body member;
an exit port formed in said body member;
4 a curved suture carrier channel formed in said body
member; and

6 a curved suture carrier movably positioned in said
curved suture carrier channel, wherein said curved suture
8 carrier has a retracted position such that said curved
suture carrier is positioned within an interior region of
10 said body member and a deployed position such that a
portion of said curved suture carrier is positioned
12 exterior to said body member, said curved suture carrier
configured within said curved suture carrier channel such
14 that said curved suture carrier exits said interior region
of said body member through said exit port along a path
16 which approaches being substantially tangential to an outer
surface of said body member surrounding said exit port.

20. A suturing instrument comprising:

2 an elongate body member having a longitudinal axis;
 a suture deployment system located within a distal end

4 portion of said elongate body member wherein said distal
 end portion includes a suture exit port, said suture

6 deployment system comprising:
 a curved suture carrier channel; and

8 a curved suture carrier movably positioned in
 said curved suture carrier channel;

10 and

 a deployment controller having a proximal end, a

12 distal end, a retracted position and a deployed position,
 said deployment controller extending substantially along

14 the longitudinal axis of said elongate body member to the
 distal end of said elongate body member where it is coupled

16 to said curved suture carrier and moves said curved suture
 carrier through said curved suture carrier channel as it

18 moves between said retracted position and said deployed
 position, said curved suture carrier channel configured

20 within said distal end portion of said elongate body member
 such that said curved suture carrier exits said suture exit

22 port along a path which approaches being substantially
 tangential to an outer surface of said body member

24 surrounding said suture exit port.

21. A suturing instrument as defined in Claim 20 further

2 comprising a suture catch positioned proximate to said distal
 end portion of said elongate body member such that a distal path

4 segment of said curved suture carrier path is intercepted by
 said suture catch as said deployment controller approaches said

6 deployed position.

~~22. A suturing instrument as defined in Claim 20 further~~

2 comprising a surgical needle positioned in a distal end of said
 curved suture carrier.

23. A suturing instrument as defined in Claim 22 wherein
2 said surgical needle further comprises a bullet needle.

24. A suturing instrument as defined in Claim 20 wherein:
2 said curved suture carrier channel and said curved
suture carrier are located in a distal tip assembly of said
4 elongate body member; and
 said distal tip assembly is joined with said elongate
6 body member such that said distal tip assembly is free to
rotate axially about said elongate body member longitudinal
8 axis.

25. A suturing instrument as defined in Claim 20 wherein
2 said deployment controller is coupled to said curved suture
carrier with a flexible driver member.

26. A suturing instrument as defined in Claim 25 wherein
2 said flexible driver member further comprises an alloy of nickel
and titanium.